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High-speed shears for cutting rolled strip to length

Ins. C1

The invention relates to flying shears with cutting tools located on drums facing each other, which tools are accelerable by at least one driving device assigned to them to a peripheral speed corresponding to the speed of the strip to be cut and with separately controllable adjusting device assigned to one of the drums.

Ins. C2

Similar shears have become known through DE-OS 21 38 478. These shears are, however, intended for the cutting of fast-running wire. For the cutting of strips, DE-OS 41 28 970 discloses linear guides for the drums, which guides are located in stands. In this case, blades are used, which require very exact synchronization between drum drive and adjusting drive in order to be able to execute a correspondingly clean cut. Through this very exact synchronization, such shears are relatively slow.

Ins. C3

The invention is based on the object of further developing flying shears for the cutting of hot strip in such a way that good cutting results are guaranteed even at strip speeds of up to 30 m/sec and with minimal strip thicknesses.

For the solving of this object it is proposed that one of the drums is mounted on rockers, that the adjusting device consists of drives effecting the cutting movement and support elements located between said drives and the rockers and that the support elements are shortenable to an effective position effecting a cut. A further solution

proposal consists in that one of the drums is mounted on rockers, that the rockers are supported by means of support elements, that the support elements are shortenable to an effective position effecting a cut, that the adjusting device has cranks which are connected with the second drum, and said second drum is capable of leading to the cut through paraxial displacement towards the first drum.

Through this design of the shears it is achieved that the drums can always be driven at a peripheral speed corresponding to the speed of the strip to be cut or at a peripheral speed slightly lowered in comparison with said speed respectively. Thereby the cutting tools can always execute the cutting movement without a cut being made. Only when a cut is to be executed are the support elements brought into effective position. The next cutting movement of the cutting tools then leads to the cut.

There is also the possibility to leave only the drums constantly at a corresponding peripheral speed and to drive the adjusting device only for a cut.

Alternatively the driving device for the drums can naturally also be brought to a standstill during the times in which no cut is to be made. In order to accelerate these drums for the cut, however, substantially greater motor outputs are required than if the drums were to run constantly at a corresponding peripheral speed.

It is of advantage if the support elements are lockable in their effective length. By this means it is achieved that a spring-back between the drums is limited to a minimum so that cuts as exact as possible can be made. With corresponding dimensioning of the support elements, the power transmission can be effected directly by them, i.e. without corresponding locking.

Through the use of chisel and anvil as cutting tools, a very exact synchronization, as is required with cutting blades, is not necessary. Nonetheless, a synchronization between the driving devices and the drives or cranks respectively is appropriate, whereby, however, slight

slips can be compensated through the fact that larger jacket areas act as an anvil.

It is advisable to bring the support elements into their effective position before the beginning of the working stroke of the drives or cranks respectively. By this means it is guaranteed that the support elements are already in effective position during the cut and irregularities cannot occur through adjustments of the support elements during the cut.

In the case of the very thin hot strips to be cut here, it has been shown that the strip starts are very difficult to guide after a cut. It is therefore of great importance to integrate the cutting devices into a corresponding coiler or to place said cutting devices at a minimum distance in front of the coiler respectively.

Ins C4 P4

The invention is explained in greater detail by means of a drawing in which

Figure 1 shows in schematic representation shears according to the invention,

Figure 2 shows a further solution compared with Fig. 1 for the adjusting drive,

Figure 3 shows the schematic representation of further shears according to the invention, and

Figure 4 shows shears according to the invention integrated into a coiler.

Ins C5 P3

Figure 1 shows shears 1 which have a drum 2 and a drum 3. The drum 3 is carried by a rocker 4. One arm of the rocker 4 is mounted pivotably around the pivot point 5. The drum 2 has a chisel 6, whereas the drum 3 is equipped with an anvil 7. The drums 2 and 3 are rotary-driven by driving devices 8 to a peripheral speed corresponding to the speed of the running strip 9. Thereby a mechanical or electrical or electronic synchronization respectively is provided between the drives 8 and thus

between the drums 2 and 3. At the second end of the rocker 4, a support element 10 is located, which support element is adjustable in its length and consists essentially of a piston-cylinder unit 11. The support element 10 is linked to a crank 12 which is acted upon by a drive 13.

The function of the shears 1 is as follows: The drums 2 and 3 are kept constantly at a corresponding peripheral speed or brought before a cut to the necessary peripheral speed respectively by the drives 8. The crank 12 is likewise constantly driven or brought before a cut to the corresponding rotational speed respectively. Thereby the ratio of the peripheral speeds between the drum 2 and the crank 12 can be set, for example to 1:8. A possible synchronization between the drum 2 and the crank 12 is indicated by the line 14 or the line 14' respectively. Through the rotary movement of the crank 12, the crank 3 is moved constantly to and fro along the arrow 15. If this adjusting movement is to lead to the cut, the piston-cylinder unit 11 is driven together before the crank reaches the lower dead point and arrested if applicable. By this means the drum 3 is pivoted to a substantially reduced distance from the drum 2. On the next reaching of the lower dead point of the crank 12, the corresponding cut is then executed. Through the synchronization between the crank 12 and the drum 2 it is achieved that, when the crank 12 is positioned at the lower dead point, the chisel 6 is facing the anvil 7, so that the strip 9 can be separated.

Ins. C6 C4

Figure 2 shows that, instead of the adjusting drive consisting of the crank 12, the drive 13 and the support element 10, a piston-cylinder unit 16 can be used, whereby this piston-cylinder unit has two separately pressurizable pistons. The upper piston corresponds to that of the piston-cylinder unit 11, whereas the lower piston replaces the crank 12 and the drive 13.

Figure 3 shows shears 1' which consist of the drums 2' and 3', whereby the drum 3' is held on the rocker 4'. The drum 2' is eccentrically mounted by means of a crank 12'. By means of an arresting device 17, the rocker 4' can be locked in the lower position of the piston of the piston-cylinder unit 11'. The function of the shears 1' is as follows: The drums 2' and 3' are constantly driven or accelerated before a cut to a corresponding

peripheral speed respectively by the motor 8'. The same applies to the crank 12', which is acted upon by the drive 13'. By this means the drum 2' executes, besides the circular movement effected by the driving device 8', a superimposed stroke movement effected by the crank 12'. If the strip 9' is to be cut, the piston-cylinder unit 11', before the chisel 6' reaches its upper point in the drawing, is retracted and blocked by the arresting device 17. By this means the distance between the drums 2' and 3' is so strongly reduced that the strip 9' is separated by the chisel 6' on the next reaching of the upper dead point.

Figure 4 shows a reverse coiler 18, whereby the strip 9 is led over a guide pulley 19 to the coiler 20. If the coiler 20 has the given number of windings and the strip 9 is to be cut, the drum 2'' is pivoted against the coiler 21, whereby the pivoting movement can be executed as specified with respect to Fig. 1 or Fig. 3. The coiler 21 acts as the corresponding anvil. After the executed cut, the strip 9 can be coiled immediately onto the coiler 21.

Survey of reference numbers

1	Shears
2	Drum
3	Drum
4	Rocker
5	Pivot point
6	Chisel
7	Anvil
8	Driving device
9	Strip
10	Support element
11	Piston-cylinder unit
12	Crank
13	Drive
14	Line
15	Arrow
16	Piston-cylinder unit
17	Arresting device
18	Reverse coiler
19	Guide pulley
20	Coiler
21	Coiler